WHAT IS CLAIMED IS:

1. An interferometer using an optical waveguide, which is formed by embedding a core that has a refractive index higher than that of a cladding into the cladding on a substrate, said interferometer comprising:

at least two types of annealing regions that are provided near the optical waveguide, wherein

an optical path length of said optical waveguide is trimmed by changing an effective refractive index of said optical waveguide by applying annealing to said annealing regions.

2. The interferometer as claimed in claim 1, wherein said annealing regions differ in their width.

3. The interferometer as claimed in claim 1, wherein said annealing regions differ in their distances from said optical waveguide to said annealing regions.

4. The interferometer as claimed in claim 1, wherein said annealing regions differ in presence or absence of a slit formed in said annealing regions in an optical waveguide direction, or in slit width.

5. The interferometer as claimed in claim 1, wherein

said annealing regions differ in presence or absence of a trench formed by partially removing a cladding around said optical waveguide, or in distance from said optical waveguide to trenches, or in depth of the trenches.

6. The interferometer as claimed in claim 1, wherein said annealing regions each consist of a thin film heater formed on said optical waveguide.

7. The interferometer as claimed in claim 1, further comprising fixed delay means for providing delay dependent on a polarization state.

8. The interferometer as claimed in claim 1, wherein said interferometer comprises at least one optical coupler and a plurality of optical waveguides connected to said optical coupler.

9. The interferometer as claimed in claim 8, wherein said interferometer comprises two 2×2 optical couplers and two optical waveguides connecting said optical couplers, wherein

optical path length difference (delay difference) between said two optical waveguides is trimmed by local annealing such that the optical path length difference is an odd multiple of $\lambda/2$ for a transverse

electric polarization mode and an even multiple of $\lambda/2$ for a transverse magnetic polarization mode, where λ is a wavelength, or that it is an even multiple of $\lambda/2$ for the transverse electric polarization mode and an odd multiple of $\lambda/2$ for the transverse magnetic polarization mode.

10. The interferometer as claimed in claim 9, wherein at least one of said two optical waveguides connecting said two 2×2 optical couplers comprises polarization dependent fixed delay means.

11. The interferometer as claimed in claim 2, wherein at least one of said annealing regions has a width equal to or greater than 2.6 times a distance d from a core center to a top surface of the cladding, or at least one of said annealing regions has a width equal to or less than 1.4 times the distance from the core center to the top surface of the cladding.

12. The interferometer as claimed in claim 2, further comprising fixed delay means for providing delay dependent on a polarization state.

13. The interferometer as claimed in claim 2, wherein said interferometer comprises at least one optical coupler and a plurality of optical waveguides

connected to said optical coupler.

14. The interferometer as claimed in claim 6, further comprising fixed delay means for providing delay dependent on a polarization state.

15. The interferometer as claimed in claim 6, wherein said interferometer comprises at least one optical coupler and a plurality of optical waveguides connected to said optical coupler.

16. The interferometer as claimed in claim 6, wherein said annealing regions differ in their width.

17. The interferometer as claimed in claim 6, wherein said annealing regions differ in presence or absence of a trench formed by partially removing a cladding around said optical waveguide, or in distance from said optical waveguide to trenches, or in depth of the trenches.

18. A fabrication method of an interferometer comprising the steps of:

forming an optical waveguide having a core that has a refractive index higher than that of a cladding and is embedded into the cladding on a substrate;

forming at least two types of thin film heaters

on said optical waveguide; and

trimming an optical path length of said optical waveguide by changing an effective refractive index of said optical waveguide by locally annealing a neighborhood of said optical waveguide by said thin film heaters.

19. An interferometer using an optical waveguide, which is formed by embedding a core that has a refractive index higher than that of a cladding into the cladding on a substrate, said interferometer comprising:

one type of annealing region that has a width from 1.4 to 2.6 times a distance from the optical waveguide to a top surface of said cladding in a neighborhood of said optical waveguide, wherein

an optical path length of said optical waveguide is trimmed by changing an effective refractive index of said optical waveguide by applying annealing to said annealing region.

20. A fabrication method of an interferometer comprising the steps of:

forming an optical waveguide including a core that has a refractive index higher than that of a cladding and is embedded into the cladding on a substrate;

forming one type of thin film heater that has a width from 1.4 to 2.6 times a distance from the optical waveguide to a top surface of said cladding in a neighborhood of said optical waveguide; and

trimming an optical path length of said optical waveguide by changing an effective refractive index of said optical waveguide by applying annealing to said annealing region.